10 Gbps Multirate XFP Transceivers

9.95 Gbps - 11.1 Gbps

Features

- 120 km with Electronic Dispersion Compensation (EDC), 80 km, and 40 km reach models
- XFI high-speed electrical interface
- 9.95 Gbps, 10.31 Gbps, 10.52 Gbps, 10.7 Gbps, and 11.1 Gbps support
- Digital Diagnostics
- Cooled EML with isolator
- APD receiver (120 km and 80 km) and PIN receiver (40 km)
- Power consumption under 3.5 watts
- -5° to 70° C operating temperature range
- XFP MSA Rev 4.5 compliance
- RoHS and China RoHS compliance
- Class 1 Laser, 21CFR 1040.10/1040.11 compliance
- EN 60825-1/A1:2002 compliance
- USA and Canada UL listing
- External reference clock synchronization

Absolute Maximum Rating

Parameter	Symbol	Min.	Typical	Max.	Unit
Maximum Supply Voltage (3.3V)	$V_{cc}3$	-0.3	-	3.6	V
Maximum Supply Voltage (5.0V)	$V_{cc}5$	-0.3	-	5.5	V
Maximum Supply Voltage (1.8V)	$V_{cc}2$	-0.3	-	2	V
Storage Temperature	T_{st}	-40	-	85	°C

General Operations

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage (1.8V)	$V_{cc}2$	1.71	1.8	1.89	V
Supply Voltage (3.3V)	$V_{cc}3$	3.14	3.3	3.47	V
Supply Voltage (5V)	$V_{cc}5$	4.75	5	5.25	V
Total Current on Any Pin	I_{cc}	-	-	500	mA
Inrush Current (1.8V)	$I_{inrush}2$	-	-	1	A
Inrush Current (3.3V)	$I_{inrush}3$	-	-	0.75	A
Inrush Current (5V)	$I_{inrush}5$	-	-	0.5	A
Module Current Ramp Rate	-	-	-	100	mA/µS
Power on 1.8V Rail	P_{2rail}	-	-	1.8	W
Power on 3.3V Rail	P_{3rail}	-	-	2.5	W
Power on 5V Rail	P_{5rail}	-	-	2.5	W
Module Total Power Consumption	P_t	-	-	3.5	W
Power Consumption-P_Down Mode	P_{p_d}	-	-	1.5	W
Power Supply Noise Rejection	PSNR	Compliant to Section 2.7.2 of XFP MSA			
Bit Rate	BR	9.95	-	11.1	Gbps
Operating Temperature (case)	T_{op}	-5	-	70	°C
Storage Temperature	T_{st}	-40	-	85	°C

Transmitter Specifications (Electical)					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Input Differential Impedence	R_{in}	-	100	-	Ω
Differential Data Input Swing	$V_{in,p-p}$	120	-	820	mV
TxDisable_Disable	V_d	2	-	$V_{cc}3$	V
TxDisable_Enable	V_{en}	GND	-	GND+0.8	V

Transmitter Specifications (Optical)						
Parameter		**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Output Power:	**XFP-10GD-LR12P**	P_O	-2	0	2	dBm
	XFP-10GD-LR08P	P_O	0	2	4	dBm
	XFP-10GD-IR04P	P_O	-1	0.5	2	dBm
Average Launch Power Tx_Off		P_{off}	-	-	-30	nm
Extinction Ratio:	**XFP-10GD-LR12P**	ER	8.2	-	-	dB
	XFP-10GD-LR08P	ER	9	-	-	dB
	XFP-10GD-IR04P	ER	8.2	-	-	dB
Eye Mask		ITU-T G.691, Telecordia GR-253-CORE, IEEE802.3 10GBASE-ZR Compliant				
Side Mode Suppression Ratio		SMSR	30	-	-	dB
Wavelength		λ	1530	-	1565	nm
Spectral Width		$\Delta\lambda_{20}$	-	-	1	nm
Jitter Generation (peak-to-peak)		$J_{gen(pk-pk)}$	-	-	0.1	UI
Jitter Generation (RMS)		$J_{gen(RMS)}$	-	-	0.01	UI
Dispersion Penalty at 2400 ps/nm[a]		DP	-	-	2	dB
Relative Intensity Noise		RIN	-	-	-130	dB/Hz
Reflectance Tolerance		ref_T	-	-	-27	dB

Receiver Specifications (Electrical)					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Reference Differential Output Impedence	Z_d	-	100	-	Ω
Differential Data Output Swing	$V_{out,p-p}$	340	-	850	mV
Output Rise Time, 20-80%	t_r	24	-	-	ps
Output Fall Time, 20-80%	t_f	24	-	-	ps
LOS Fault	V_{LOS_fault}	host_Vcc3 - 0.5	-	host_Vcc3	V
LOS Normal	V_{LOS_normal}	GND	-	GND + 0.4	V

Receiver Specifications (Optical)						
Parameter		**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Sensitivity (9.95 Gb/s):	**XFP-10GD-LR12P**[a]	$Rx_{sens995}$	-	-	-24	dBm
	XFP-10GD-LR08P[b]	$Rx_{sens995}$	-	-	-24	dBm
	XFP-10GD-IR04P[a]	$Rx_{sens995}$			-16	dBm
Sensitivity (10.7 Gb/s):	**XFP-10GD-LR12P**[a]	$Rx_{sens1070}$	-	-	-23	dBm
	XFP-10GD-LR08P[b]	$Rx_{sens1070}$	-	-	-23	dBm
	XFP-10GD-IR04P[a]	$Rx_{sens1070}$	-	-	-15	dBm
Overload:	**XFP-10GD-LR12P**[a]	Rx_{OL}	-7	-	-	dBm
	XFP-10GD-LR08P[b]	Rx_{OL}	-7	-	-	dBm
	XFP-10GD-IR04P[a]	Rx_{OL}	0	-	-	dBm
Wavelength[c]		λ	1528	-	1561	nm
Optical Return Loss		ORL	-	-	-27	dB
LOS Assert:	**XFP-10GD-LR12P**	-	-34	-	-	dBm
	XFP-10GD-LR08P	-	-34	-	-	dBm
	XFP-10GD-IR04P	-	-24	-	-	dBm
LOS De-assert:	**XFP-10GD-LR12P**	-	-	-	-24	dBm
	XFP-10GD-LR08P	-	-	-	-24	dBm
	XFP-10GD-IR04P	-	-	-	-16	dBm
LOS Hysteresis		-	0.5	-	-	dB

a) At 8.2dB ER, 1^{e-12} BER, 2^{31}-1 PRBS, back to back
b) At 9dB ER, 1^{e-12} BER, 2^{31}-1 PRBS, back to back
c) Operational over 1200 - 1625 nm range

Reference Clock					
Parameter	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Clock Differential Input Impedance	Z_d	80	100	120	Ω
Differential Input Clock Amplitude (p-p)	-	640	-	1600	mV
Reference Clock Duty Cycle	-	40	-	60	%
Reference Clock Rise/Fall Time (20%-80%)	T_r/T_f	200	-	1250	ps
Reference Clock Frequency	f_0	-	Baud/64	-	MHz

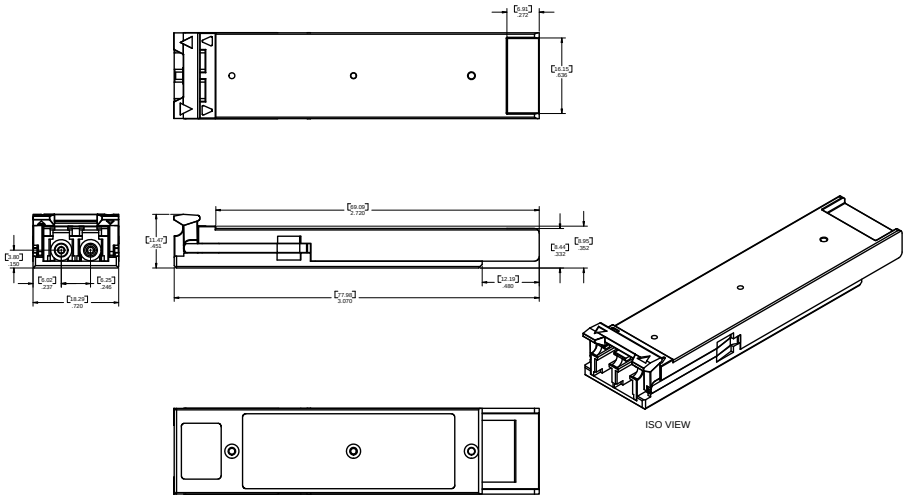
Pin Out Definition				
Pin	**Logic**	**Symbol**	**Name/Description**	**Note**
1		GND	Module Ground	1
2		VEE5	Optional -5.2V power supply (not used)	
3	LVTTL-I	Mod_DeSel	Module De-Select; when held low allows module to respond to 2-wire interface interface	
4	LVTTL-O	Interrupt	Interrupt; indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; turns off transmitter laser output	
6		Vcc5	+5 V Power Supply	
7		GND	Module Ground	1
8		Vcc3	+3.3 V Power Supply	
9		Vcc3	+3.3 V Power Supply	
10	LVTTL-I/O	SCL	2-Wire Serial Interface Clock	2
11	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTL-O	Mod_Abs	Indicates module is not present. Grounded in the module	2
13	LVTTL-O	Mod_NR	Module Not Ready; indicating module operational fault	2
14	LVTTL-O	RX_LOS	Receiver Loss of Signal Indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver Inverted Data Output	
18	CML-O	RD+	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		Vcc2	+1.8 V Power Supply	
21	LVTTL-I	P_Down/RST	Power Down; When high, requires the module to limit power consumption to 1.5 W or below. 2-wire serial interface must be functional in the low power mode. Reset; the falling edge initiates a complete rest of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		Vcc2	+1.8 V Power Supply	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock Non-Inverted Input, AC coupled on the host board	
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC coupled on the host board	
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter Inverted Data Input	
29	CML-I	TD+	Transmitter Non-Inverted Data Input	
30		GND	Module Ground	1

Note:
1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7k-10kohms to a voltage between 3.15 V and 3.45 V on the host board.

Ordering Information

Model	Description	Data Rate	Wavelength (nm)	Dispersion Penalty (dB)	Dispersion Spec. (ps/nm)	Bail Latch Color	Distance (km)
XFP-10GD-LR12P	10 GbE or 10G FC single-mode XFP tranceiver with Digital Diagnostics. Requires external reference clock.	9.95 - 11.1 Gbps	1550	2	2400	White	120
XFP-10GD-LR08P	10 GbE or 10G FC single-mode XFP tranceiver with Digital Diagnostics. Requires external reference clock.	9.95 - 11.1 Gbps	1550	2	1600	White	80
XFP-10GD-LR04P	10 GbE or 10G FC single-mode XFP tranceiver with Digital Diagnostics. Requires external reference clock.	9.95 - 11.1 Gbps	1550	2	800	White	40

Mechanical Drawing



1. MRV'S XFP TRANSCEIVERS ARE COMPLIANT WITH THE DIMENSIONS DEFINED BY XFP MULTISOURCING AGREEMENT (MSA).

NOTES: UNLESS OTHERWISE SPECIFIED

Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic descharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indeirect radiation.

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